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Better Health in Times of Hardship?

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Abstract

This paper examines the impact that the Great Recession had on individuals' health behaviours and risk factors such as diet choices, smoking, alcohol consumption, and Body Mass Index, as well as on intermediate health outcomes in England. We exploit data from the Health Survey for England for the period 2001-2013 and capture the change in macroeconomic conditions using regional Unemployment Rates (URs) and an indicator variable for the onset of the recession. We observe an overall tendency towards moderation in smoking and alcohol intake. Interestingly, the recession indicator itself is associated to a *decrease* in fruit intake, a shift of the BMI distribution towards obesity, an increase in medicines consumption, and the likelihood of suffering diabetes, heart and mental health problems. These associations are more intense for the less educated and for women. When it exists, the association with UR tends to weaken after 2008. Our findings indicate that some of the health risks and intermediate health outcomes changes are associated with mechanisms not captured solely by worsened URs. We hypothesize that the uncertainty and the negative expectations generated by the recession may have influenced individual health outcomes and behaviours beyond the adjustments induced by the worsened macroeconomic conditions. The net effect translated in the erosion of the propensity to undertake several health risky behaviours but an exacerbation of some morbidity indicators.

Keywords: Great Recession, health behaviour, risky health behaviour, morbidity, unemployment, Health Survey for England.

JEL Classification: I10, I12, I19

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1 Introduction

The virulence of the Great Recession has triggered interest on its social spill-overs, in particular its impact on population's health and wellbeing. Indeed, while the direct effect of the crisis in terms of worsened macroeconomic indicators is obvious, there are negative externalities in terms of population welfare that demand quantifying. The relationship between macroeconomic conditions and health outcomes has been studied in the literature (Ruhm, 2000; Ruhm, 2003, 2005; Neumayer, 2004; Gerdhtham and Ruhm, 2006) but a clear understanding of this relationship is yet to be established. Evidence is often limited to a few countries and, most recently, it has largely focused on EU-bailout countries. The existing results are therefore mainly country-specific, and their conclusions seem to depend on the methodological approach and the type of health outcomes considered.

This paper contributes to the growing body of literature on the impact of economic recessions on health risks and outcomes in several ways. First, we examine individual level data (rather than country or regional aggregated data) on health risks and morbidity in England. We include risk factors such as smoking, drinking or BMI, which have been used in the literature, but also examine dietary choices such as consumption of fruit and vegetables, not much studied to this point. Our approach is original insofar we use both intermediate health behaviours and morbidity as indicators of health outcomes instead of mortality. Our assumption is that health behaviours, as intermediary factors in the health production function, provide a wider picture of the impact of the recession. Changes in health behaviours may preceede changes in mortality rates. Secondly, as it is common, we capture adverse macroeconomic conditions by exploiting regional Unemployment Rate (UR), but we also include a *post-2008* indicator variable to capture impacts of the recession that trascend worsened URs. Thirdly, our specification account for the potential endogeneity of the income variable. The positive relationship between income and health has long been established with individuals with higher income being in better health. Nevertheless, the problem of reverse causality between health and income has not been considered when using individual level data in this context. Our approach controls for income and uses instrumental variables to correct for its potential endogeneity.

We use the Health Survey for England (HSE), a repeated cross sectional data, for the period 2001-2013. Our results indicate that changes in regional URs are associated to a *decrease* in cigarette consumption, explained by a shift from heavy to moderate smoking and a *decrease* in moderate drinking. Higher UR decreases the probability of mental problems. Effects on all other measures are captured by the *post-2008* indicator variable estimate instead: the aftershock of the Great Recession translates into a *decrease* in fruit intake; an *increases* in BMI and the likelihoods of being obese; an

increased demand for medicines and in the likelihoods of suffering diabetes, heart problems and mental health. All these associations are stronger for those less educated and vary by gender.

The paper is structured as follows. Section 2 summarises the existing literature relating to health outcomes and economic downturns. Section 3 presents the HSE data on health risks, health intermediate outcomes, and socio-economic controls and describes the variables used to capture macroeconomic conditions. Section 4 lays out the empirical strategy and Section 5 discusses the results of the benchmark case and its extensions. Finally, Section 6 discusses our findings and concludes.

2 Background

The link between economic recessions and health has been documented by Ruhm in a number of studies that use data pre-dating the 2008 recession mostly using regional UR as a measured of worsened economic conditions. It has been shown that risk factors such as smoking increase during economic expansions (Ruhm, 2000; Ruhm, 2005; Xu and Kaestner, 2010), while there is a reduction in physical activity and a boost on healthier diet (Ruhm, 2000; Ruhm, 2000). Overall, physical health deteriorates during economic upturns as shown by increased mortality (Ruhm, 2000; Neumayer, 2004). The overall effect for mental health seems to be opposite to that on physical health. There appears to be some consensus that worsened economic conditions lead to poorer mental health (Ruhm, 2003; Charles and DeCicca, 2008) but the effect on suicides has been mixed with some evidence that mortality is counter-cyclical (Ruhm, 2000) and some other showing that suicides are pro-cyclical (Neumayer, 2004).

In general, changes in mortality appear to be partly attributed to changes in behaviour. For example, shorter working hours allow for a healthier lifestyle, not only reflected in a decrease of tobacco consumption but also in a reduction of alcohol consumed. The positive effect on alcohol consumption in tight economic conditions typically arises due to a shift in drinking patterns from heavy drinking behaviours towards more moderate drinking habits possibly due to an income effect (Ruhm and Black, 2002; Ettner, 2007; Xu, 2013; Charles and DeCicca, 2008). Evidence of the association between economic recessions and weight is mixed. Ruhm (2005) and Jonsdottir and Asgeirsdottir (2014) find that weight gain is reduced when the economy worsens whereas Charles and DeCicca (2008) conclude the opposite.

Such health effects are not necessarily the same for the entire population and often appear to be dependent on age, gender, ethnicity and education. Typically, for young adults and those in working age, dowturns in the business cycle translate into reduced mortality and higher healthcare use (Ruhm, 2000; Ruhm, 2003). Older individuals tend to experience an amelioration of risk behaviours

instead (Ruhm and Black, 2002). Women are less affected by adverse economic conditions and even improve their mortality rates (Neumayer, 2004). However, males experience the biggest reduction in morbidity (Ruhm, 2003) possibly through less engament in risky behaviours such as drinking (Ruhm and Black, 2002), decreased smoking and increased physical inactivity (Ruhm, 2005). Unhealthy behaviours in the US appear to be procyclical in particular for non-whites (Ruhm, 2005). Haaland and Telle (2015) find that less educated and lower income groups are not hit harder by increased unemployment in terms of mortality indicators than the more advantaged groups. However, there is evidence that better educated (young) individuals respond more significantly to higher unemployment by reducing risky behaviours such as drinking and smoking (Cutler et al, 2015). Other studies have found no gender differences in changes in health status, mental health and drinking intensity due to economic downturns (Davalos and French, 2011; Davalos et al., 2012).

Several other papers have supported the overwhelmingly procyclical effect of economic environment and health (Brenner and Mooney, 1983; Brenner, 1987; Tapia-Granados, 2005; Gerdtham and Johanneson, 2005; Gerdtham and Ruhm, 2006; Tapia-Granados and Diez-Roux, 2009; Haaland and Telle, 2015). Nevertheless, there is also limited evidence of a countercyclical relationship between economic crises and mortality indicators (Cutler et al, 2002; Gerdtham and Johannesson, 2005; Svenson, 2007; Economou et al, 2008). Most of this early evidence on the pro-cyclical impact of economic fluctuations on health outcomes is based on data from the 1970s to the 2000s. When more recent data has been used, the procyclical hypothesis has been weakened substantially (McInerney and Mellor, 2012; Stevens et al, 2015; Ruhm, 2015).

The Great Recession that started in December 2007 has been the crudest world economic crisis since the 1950s. Not surprisingly, there has been a large body of literature examining its impact on health outcomes (Stuckler et al., 2011, and Suhcker et al., 2012). Empirical evidence shows that the 2008 recession led to an increase in suicides (Lopez-Bernal et al., 2013; Reeves et al 2014; Reeves et al., 2012; Vandoros and Kavetsos 2015), which appears to be associated with government spending and is gender and age specific (Antonakakis and Collins, 2014, 2015).

Evidence for Europe suggests that the 2008 recession had a beneficial impact on health, except for suicides (Toffolutti and Suhrcke, 2014; Regidor et al., 2014). Gili et al (2013) and Modrek (2015) find that unemployment increases mental health problems. The evidence is not supportive of the pro-cyclical effect of the business cycle for Greece, one of the most hardly hit by the Great Recession (Simou and Koutsogeorgou, 2014; Vandoros et al., 2013, 2014, 2015; Zavras et al., 2013; Hessel et al., 2014). Using data from Iceland, Jonsdottir and Asgeirsdottir (2014) found that body weight was countercyclical and the effects of losing weight were stronger for those who lost their job relative to those that remained working.

Recent studies from the US have largely focused on the effects of the recession of 2008 on population subgroups. Pabilonia (2015) show that Hispanic boys were more likely to consume alcohol, marijuana and to become obese, girls more likely to smoke and black girls more to drink. Further evidence shows unemployment was associated with lower self-reported mothers' health and increased tobacco and drug use, especially for those with a disadvantaged background (Currie et al 2015). Older adults in the US reported lower subjective measures of mental health as a consequence of a wealth loss after the market collapsed in the last quarter of 2008 (McInerney et al., 2013). Access to health care may also be affected by lower health insurance coverage (Cawley et al, 2015). Other approaches have also concluded that financial distress has a negative outcome on healthcare resource use, mental health and life expectancy across OECD countries (Currie and Tekin, 2011; Clayton et al, 2015).

3 Data

Our analysis exploits data from the HSE, a cross-sectional survey taken yearly from a representative sample of about 9,000 private English households. We use data of respondents above 16 years of age for the period 2001-2013 to estimate the impact that the Great Recession had on health behaviours and outcomes. In addition to socio-economic characteristics, the HSE includes information on a wide range of health lifestyles and health conditions. We select variables covering a range of individual morbidity variables, health behaviours and lifestyle characteristics that are present in all waves in our sample. We complement these household-level surveys with aggregate macroeconomic indicators at the regional level obtained from the Office of National Statistics (ONS).

3.1. Dependent variables: health risks, behaviours and health outcomes

Health risks and behaviours

The impact that economic fluctuations may have on risk factors and behaviours is likely to have much longer term effects on morbidity and mortality as shown by the literature that focuses on how lifestyle factors act as determinants of health outcomes. Alcohol consumption has been shown to increase mortality rates and negatively affect life expectancy. Smoking has also been linked to increased mortality or lower life expectancy during economic downturns and the evidence on diet is mixed (Grubaugh and Santerre, 1994; Cremieux et al., 1999; Cremieux et al., 2005; Berger and Messer, 2002; Brainerd and Cutler, 2005).

The HSE provides health behaviour information such as fruit and vegetable intake, cigarette and alcohol consumption as well as weight and height measurements of the individual. Consumption of fruit and vegetables is measured as the total portion of fruits and vegetables that an individual has

eaten the day before the survey. This information was not available for the 2012 survey (although it was again included in the 2013 survey), thus the econometric analysis only shows estimation results for the 2001-2011.

We also consider the potential impact of the recession on BMI. BMI is highly correlated with health, that is a BMI of 25 and above in adults is considered to be a risk factor for the development of heart disease, stroke and diabetes, just to mention a few. As summarised in Section 2, unemployment has already been shown to increase the proportion of obese and overweight individuals (Charles and DeCicca, 2008). We examine how the recession is associated with changes in BMI, measured as a continuous variable, and also to the likelihood of being overweight, obese or severely obese. We construct indicator variables for being overweight, obese and severely obese that take a value equal to 1 when individuals have a BMI between 25 and 29.9, between 30 and 39.9, and equal or higher than 40, respectively, and are zero otherwise.

We also examine the effect of the Great Recession on smoking. Our first measure is cigarette consumption defined as the number of cigarettes smoked per day. For smokers, the effect of the Great Recession might presumably be different along the distribution of the cigarette consumption. Therefore, we create three smoking dummies that reflect smoking intensity: light smoking (under 10 cigarettes per day); moderate smoking (between 10 and under 20 cigarettes per day); and heavy smoking (20 or more cigarettes per day). The data are rich enough for us to exploit information on drinking intensities. Based on alcohol consumption in the heaviest drinking day of the previous 7 days, respondents are classified as non-drinkers (if they report not drinking during the previous week); light drinkers (up to 4 units for men or 3 units for women); moderate drinkers (between 4 and 8 units for men or between 3 and 6 for women); and, heavy drinkers (above 8 units for men or 6 units for women). Note that financial conditions are expected to have ambiguous effects on cigarette and alcohol consumption. As reduced affordability may decrease intake, stress and anxiety may offset this income effect and increase consumption.

Health Outcomes

We exploit the HSE information on individual morbidity. The first measure is the number of medicines taken prescribed by the doctor, e.g. zero means the respondent does not take any medicine. This is a measure of morbidity as well as a proxy for health care utilisation. Adverse economic conditions decrease the probability of hospitalisation (Ruhm, 2003) but the evidence is mixed for doctor visits (Ruhm, 2003; Xu, 2013). Although medicine intake is not a measure of direct utilisation, and as we don't have data on doctor or hospital visits, we interpret this as a proxy. In

the UK, new prescriptions can only be obtained after a visit to the doctor and repeat prescriptions are monitored by General Practitioners.

We also have detailed information on whether respondents suffer from any illness and if so, on the type of illness. This allows us to create indicator variables for cancer; digestive problems (stomach ulcer, other digestive, bowel, other); diabetes (also includes any other metabolic and endocrine disorders); high blood pressure (BP); heart problems (stroke, heart attack, angina, or other heart problems); and mental problems (mental illness, anxiety, depression). These health conditions are likely to be sensitive to the economic environment. Table A1 in the Appendix presents summary statistics for all health risks, behaviours and health outcome variables.

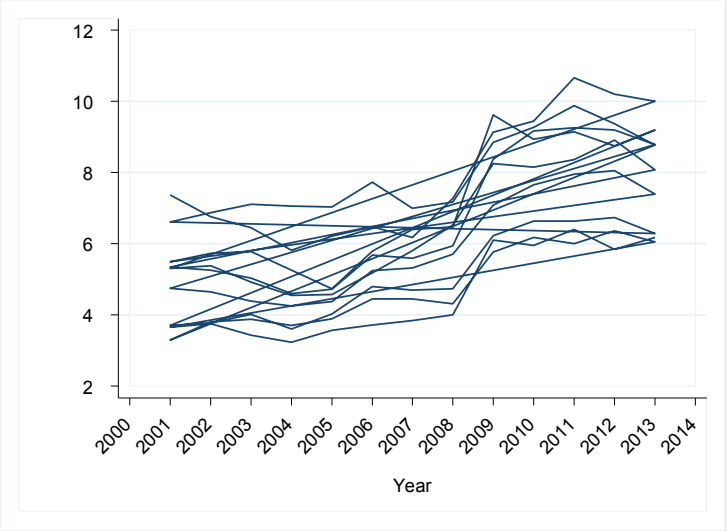
3.2. Control variables

In addition to the economic environment, we control for a number of other factors such as age, household size, sex, legal marital status, ethnicity, highest qualification obtained, employment status and a measure of health status. The model also includes equivalised income in logarithmic terms. In terms of the sample, 55% of it are women, the average age is 55.25 years, above fifty percent are married and predominantly white, 26% have at least a degree or equivalent, and 41% are employed.

3.3. Economic Cycle Indicators

Our central measure of macroeconomic conditions is the UR in each Government Office Region (GOR) for each year covered in the study obtained from the ONS. Regional labour market statistics are reported in 3 months' intervals and the yearly UR is computed as the average UR over each year. As seen in Figure 1, in 2013 the UR in all regions were still well above the unemployment figures prior to the 2008 recession, reflecting the severity of the economic crisis.

Figure 1. UR by GOR



Source: ONS

Additionally, we create the indicator variable, *d08*, that takes value equal to 1 from 2008 onwards, and 0 before. This variable captures changes triggered from 2008 onwards not captured by fluctuations in regional URs solely, that is, variations of other macroeconomic indicators and perceived economic outlook. Our first specification examines the association between our variables of interest and changes in regional *UR*. The second specification includes the *d08* indicator instead. Finally, we estimate a model containing both, *UR* and *d08,* and an interaction term of both. The latter is our benchmark specification and it allows us to estimate the impact of the *UR* prior to 2008 and thereafter. Note that the exact point in time when the recession may have the biggest cumulative impact on health outcomes and health behaviours is unknown, i.e. detrimental changes in health behaviour that may occur at the beginning of the economic downturn may be cumulative.

4 Empirical Strategy

In order to capture the association between macroeconomic conditions and health behaviour and health outcomes using the HSE, we first use the following general empirical specification:

$$health_{itr} = \beta_0 + UR_{rt}\beta_1 + X'_{itr}\beta_2 + \gamma_t + \delta_r + \varepsilon_{itr} \quad (1)$$

where $health_{irt}$ represents one of the health variables of interest as defined in the previous section. Subscripts *i, r,* and *t* indicate observations by individual *i*, living in region *r,* and interviewed in period *t*. The variable UR_{rt} denotes the UR of region *r* at time *t* (hereafter, we will refer to this as UR_t), aimed at capturing macroeconomic conditions in the economy. Individual socio-economic characteristics are contained in vector X'_{irt}. Unobserved regional and time effects are captured by

regional and year dummies δ_r and γ_t, respectively, and ε_{irt} reflects the unexplained individual idiosyncratic variation. Time and regional indicators are especially important as they control for changes over time and/or at the regional level. For instance, over these years there were a number of public health campaigns encouraging healthier lifestyles. These strategies may have had a cumulative effect on nutrition habits, smoking, drinking and morbidity. In our second specification, we include as recession indicator in equation (1) the variable *d08* instead of UR_t. The third specification includes both variables, UR_t and *d08*.

Endogeneity of the income variable

The vector of explanatory variables includes income, which can potentially cause endogeneity problems in the estimation, i.e., those with better health and having healthier lifestyles are more likely to have higher income, and, reversely, wealthier individuals tend to be healthier (Ettner, 1996; Deaton and Paxton, 1998; Marmot, 2002; Lynch et al., 2004). Ruhm (2005) discusses the potential endogeneity of personal income because income and health measures are likely to be determined simultaneously. He overcomes this problem by using state-level measures of income as controls instead of individual income. Clayton et al. (2015) use Instrumental Variables (IV) to correct for the simultaneity between household debt and health outcomes. In this paper, we adopt the latter approach. To the best of our knowledge, this is the first individual level data study that addresses the problem of reverse causality between health measures and income. Our two instrumental variables, number of bedrooms in the household and the tenure type of the household (i.e. own, rent, etc.), are correlated with income and satisfy the standard moment condition of not being correlated with the error term. These instruments are associated with income but are pre-determined and thus, in principle, not necessarily related to immediate changes in health outcomes or behaviours due to changes in income. Testing for income endogeneity supports the IV estimation method on the grounds of the Wald test.

5 Results: The Great Recession beyond regional URs

In this section, we first present the benchmark estimates of the association between different health risks and behaviours and intermediate health outcomes and the recession. Results are reported in Tables 1, 2 and 3. We only report the coefficients of the main economic variables of interest. Column (1) shows the estimates when we include the UR_t; Column (2) when we include the post-2008 dummy d08; and Column (3) when we include both UR_t, *d08* and their interaction UR_tx*d08*. Hereafter, we will refer to the specification containing the interaction as the *full specification.*

Table 1 contains the estimates for the models for fruit and vegetable intake and BMI, while Table 2, presents those for the smoking and drinking models. Finally, the estimates for the morbidity indicators are presented in Table 3. In all specifications we reject the hypotheses of exogeneity of the income variable with a 1% confidence level. The exceptions are the equations for moderate smoking (p-value 0.08) and cancer (p-value 0.15).

With the exception of the IV estimation for BMI, we use non-linear estimation methods (Tobit and probit). Thus, in addition to the coefficients, we report the Average Marginal Effect (AME) in Tables A2 to A4 in the Appendix corresponding to the coefficients presented in Tables 1 to 3. The AMEs for *d08* are calculated using the average UR. The AMEs for UR_t assess the impact of UR before and after 2008.

5.1 Benchmark Model: Great Recession and UR_t

Column (1) in Table 1 shows that UR_t is not significantly associated with changes in the intake of vegetables or fruits, in BMI, or the likelihood of being overweight, obese or severely obese. Estimates in Column (2), when including only the recession indicator, *d08*, show its negative association with dietary habits and BMI. After the recession individuals are heavier, as reflected by a higher likelihood of being obese or severely obese and lower probability of being overweight. The estimates in Column (3), which includes both *d08* and UR_t as well as their interaction, show that the effect on the fruit intake and BMI is captured mainly by the recession indicator. This suggests that the recession had an impact on these variables that did not originate in changes *UR* but in factors that trascend these. Overall, the results of the full specification corroborate the findings in columns (1) and (2), thus, hereafter, we focus the discussion of results on the full specification.

The AMEs corresponding to the full specification model in Column (3) are shown in Table A2 in the Appendix. These results indicate that, after 2008, fruit consumption was lower by 0.26 portions on average and BMI increased by 0.94 units. The increase in BMI seems to translate in a change of the BMI distribution: whereas post-2008 there is a decrease in the probability of being overweight by 6 percentage points (pp), the probability of being obese (severely obese) is up by 5.3 (3.2) pp.

Table 1. Health Risks and Behaviours (I): Diet and BMI

	(N)	(1)	(2)	(3)	(4)	(5)
Vegetables	91,044					
UR (t/t-1)		-0.0066		0.0071	0.0066	0.0123
d08			-0.0196	0.0920		0.1067
d08xUR				-0.0167		-0.0202*
Fruit	91,045					
UR (t/t-1)		0.0210		0.0110	-0.0106	-0.0144
d08			-0.3264***	-0.4596***		-0.3925***
d08xUR				0.0122		0.0131
BMI	93,084					
UR (t/t-1)		-0.0590		-0.0551	-0.0323	-0.0288
d08			0.754***	0.940***		0.882***
d08xUR				-0.00437		-0.00633
BMI25	93,084					
UR (t/t-1)		0.0111		0.0056	0.0053	0.0001
d08			-0.0987***	-0.1606***		-0.1759***
d08xUR				0.0060		0.0096
BMI30	93,084					
UR (t/t-1)		-0.0151		-0.0174	-0.0056	-0.0059
d08			0.1529***	0.1823***		0.1638**
d08xUR				0.0025		0.0006
BMI40	93,084					
UR (t/t-1)		-0.0336		-0.0115	-0.0241	-0.0060
d08			0.3637***	0.5665***		0.6005***
d08xUR				-0.0221		-0.0274*

Note: Models for vegetables and fruit are estimated using IV Tobit, BMI is estimated using 2SLS methods, all others using IV Probit. Columns (1) and (4) show the coefficients of the regression using UR_t and UR_{t-1} only, respectively. Column (2) shows results when including d08 only. Columns (3) and (5) show results when the UR_t or UR_{t-1}, *d08* and their interaction are included. Robust standard errors are reported. Estimation clustered by household. Socio-economic controls included: log of income, gender, age, household size, marital status (single, married, separated/divorced, widow), ethnicity (white, mixed, black/black British, Asian/Asian British, other), education (no qualifications, GCSE, Alevel, degree or higher, foreign degree, FT education), economic activity (employed, unemployed, retired, inactive) and whether the individual suffers from a long-standing illness. Reference categories Single, White, No Qualifications, Employed. Time and regional dummies included. The *p-value* of the test of exogeneity of income variable (H_0: exogenous) is 0 across all specifications. N indicates number of observations. Study period for fruit consumption is 2001-2011.*** p<0.01, ** p<0.05, p<0.1.

Estimates in Column (3) Table 2, reveal that UR_t, is negatively associated with daily cigarette consumption and the likelihood of being a heavy smoker or a moderate drinker. Instead, it is positively associated with the probability of being a moderate smoker and not drinking. The recession indicator variable *d08* is statistically significant in explaining some changes in smoking and drinking. It is associated with a decrease in the likelihood of smoking heavily, and of drinking lightly, moderately; as well as with an increase in not drinking at all. Smoking increases after 2008 in the number of cigarettes consumed and the likelihood of being a light and moderate smoker. Note that UR_t seems to dominate most of the changes in smoking and drinking behaviour is affected by both UR_t and *d08*.

Table A3 in the Appendix reports the AMEs of UR_t before and after 2008 for the specification in Column (3) in Table 2. The marginal effect of UR_t before the recession is a decrease the number of daily cigarettes in 0.29; the probability of being a heavy smoker by 2.6 pp and that of moderately drinking by 0.7 pp. Instead it increases the likelihood of being a moderate smoker in 2 pp and that of not drinking in the last week by 1 pp. In general, all these effects prevail after 2008 but they all become marginally smaller.

Table 2. Health Risks and Behaviours (II): Smoking and Alcohol

	(N)	(1)	(2)	(3)	*(1)*	*(3)*
Cigdaily	105,995					
UR (t/t-1)		-0.8455***		-1.2120***	-0.8368***	-0.9659***
d08			1.5373***	1.7290		2.0954
d08xUR				0.4126**		0.2546
Light Smoker	23,993					
UR (t/t-1)		0.0271		0.0374	0.0469**	0.0522**
d08			0.0990**	0.0879		0.0520
d08xUR				-0.0120		-0.0116
Moderate Smoker	23,993					
UR (t/t-1)		0.0434*		0.0497*	0.0215	0.0209
d08			0.1439***	0.0614		0.0758
d08xUR				-0.0073		0.0015
Heavy Smoker	23,993					
UR (t/t-1)		-0.0685***		-0.0887***	-0.0722***	-0.0784***
d08			-0.3037***	-0.2385*		-0.2096
d08xUR				0.0237		0.0146
No drinking	105,367					
UR (t/t-1)		0.0176		0.0332**	0.0205*	0.0269**
d08			0.3976***	0.4346***		0.4144***
d08xUR				-0.0169**		-0.0111
Light Drinking	105,367					
UR *(t/t-1)*		-0.0009		-0.0117	0.0037	-0.0038
d08			-0.1738***	-0.2300***		-0.2671***
d08xUR				0.0116		0.0130*
Moderate Drinking	105,367					
UR *(t/t-1)*		-0.0256*		-0.0282*	-0.0338***	-0.0340**
d08			-0.1984***	-0.1417**		-0.1095
d08xUR				0.0029		0.0004
Heavy Drinking	105,367					
UR *(t/t-1)*		-0.0205		-0.0221	-0.0179	-0.0135
d08			-0.0901***	-0.0411		0.0137
d08xUR				0.0017		-0.0083

Note: Model for cigarette consumption (Cigdaily) is estimated using IV Tobit. Coefficients for the other health dependent variables are obtained using IV Probit. The *p-value* of the test of exogeneity of income variable (H_0: exogenous) is 0 across all specifications, except for Moderate Drinking p-value is 0.08 and only significant at the 10% confidence level. *** p<0.01, ** p<0.05, p<0.1. See notes in Table 1.

With respect to the intermediate health outcomes displayed in Table 3, we observe that UR_t is only significantly and negatively associated with changes in mental health problems. However, *d08* is significantly associated with an increase in the consumption of medicines and to the likelihood of suffering diabetes, high BP, heart and mental health problems, and negatively associated with high BP. Interestingly, these results imply that the effects of the recession on morbidity are channelled mostly through changes that go beyond worsened *URs*. The AMEs in Table A4 indicate after 2008 there is an increase of 0.44 units in the consumption of medicines and higher likelihood of suffering from diabetes, heart and mental health problems by 2.1, 2.4 and 5.4 pp. There is also a lower probability of suffering from high BP of 2.4 pp. The AME of UR_t on the probability of having mental health problems decreases from 0.5 pp before 2008 to 0.4 after the recession.

Table 3. Health Outcomes: Morbidity

	(N)	(1)	(2)	(3)	*(4)*	*(5)*
Medicines	77,287					
UR (t/t-1)		-0.0090		-0.0358	0.0196	0.0058
d08			1.2327***	1.1178***		1.0188***
d08xUR				0.0279		0.0248
Cancer	106,550					
UR (t/t-1)		0.0016		0.0032	-0.0408*	-0.0464*
d08			0.0164	0.0201		0.0703
d08xUR				-0.0016		0.0091
Digestive	106,550					
UR (t/t-1)		-0.0153		-0.0221	-0.0318*	-0.0364**
d08			0.0235	0.0303		0.0597
d08xUR				0.0071		0.0078
Diabetes	106,550					
UR (t/t-1)		-0.0146		-0.0267	-0.0374**	-0.0463**
d08			0.2711***	0.2484***		0.2856***
d08xUR				0.0126		0.0138
High BP	106,550					
UR (t/t-1)		0.0133		-0.0065	0.0107	-0.0056
d08			-0.0554	-0.2038**		-0.2677***
d08xUR				0.0216*		0.0283**
Heart	106,550					
UR (t/t-1)		-0.0106		0.0072	0.0105	0.0227
d08			0.1121***	0.2291**		0.2119**
d08xUR				-0.0178		-0.0200*
Mental	106,550					
UR (t/t-1)		-0.0641***		-0.0719***	-0.0355*	-0.0344*
d08			0.4993***	0.6377***		0.6040***
d08xUR				0.0082		-0.0014

Note: Model for *Medicines* is estimated using IV Tobit. The *p-value* of the test of exogeneity of income variable (H_0: exogenous) is 0 across all specifications, except for Cancer p-value is 0.14 and not statistically significant at any reasonable confidence level. *** p<0.01, ** p<0.05, p<0.1. See notes in Table 1.

5.2 Robustness and extensions

5.2.1 Recession and lagged regional unemployment

The effect of worsened *UR* on health risks, behaviours and outcomes may not necessarily be contemporaneous as there may be cumulative effects over time. Thus, health outcomes and BMI may experience the effect of unemployment fluctuations with a lag. Nevertheless, it is unclear whether a priori we should expect diet, smoking and alcohol patterns to be more likely to be affected by contemporaneous or lagged regional *UR.* In order to explore whether lagged effects prevail, we re-estimate all specifications including lagged *UR* and its interaction with the *d08* variable. Results for these specifications are shown in Columns (4) and (5) in Tables 1 to 3.

Overall, UR_{t-1} has a very similar pattern of association with diet and BMI, that is, lagged *URs* are not the main explanation of the changes observed in these variables. For smoking and drinking, the only difference with respect to the benchmark is that UR_{t-1} is positively and significantly associated with the probability of light and moderate smoking. But, interestingly, while UR_t was *only* significantly associated with the likelihood of having mental health problems, UR_{t-1} is negatively associated to the probabilities of diabetes, cancer and digestive problems, that is, *UR* seems to have a delayed effect on these morbidity indicators. As per Table A3 in the Appendix, the AMEs of UR_{t-1} is only significant before 2008 and associated to a modest reduction in the probabilities of having cancer (0.20 pp), digestive problems (0.3 pp) and diabetes (0.4 pp) and mental health problems (3.1 pp). Reassuringly, the results using lagged *UR* support the previous finding that *URs* had a stonger association with health outcomes before the Great Recession than after.

5.2.2. Estimates by gender

In this section we explore whether there are differences in the results by gender. Columns (1) and (2) in Tables A5, A6 and A7 in the Appendix show the AMEs by gender. As reported in Table A5, the main significant estimate for health outcomes is the indicator variable *d08*. The main difference with respect to full sample results is that there is an increase in vegetables consumption since 2008 affecting only males, while both males and females decrease fruit intake and increase BMI. The decrease in overweight and increase in obesity mainly affect males also, while the increase in the likelihood of being severely obese is stronger for women. In general, the AMEs of *d08* are larger for women than for men. For instance, the effects on BMI and on the probability of being severely obese are almost twice as large (1.14 BMI units and 4 pp for females, as opposed to 0.67 BMI units and 1.8 pp for males).

Table A6 shows that the association between UR_t and the number of cigarettes smoked and the probability of being a heavy smoker is stronger for females than males, and again the estimates are mainly significant before the Great Recession. For women, the AME of an increase in the UR_t of one pp before 2008 is associated to a reduction in daily cigarette consumption by 0.31 units compared to only 0.27 for men and its significance prevails although of smaller in magnitude after 2008 for women but not for men. Similar patterns emerge for heavy smoking. Larger UR_t improve alcohol consumption by reducing heavy drinking and increasing the likelihood of not drinking at all in the previous week, but this association is only significant for men. The AME of UR_t on moderate drinking for women is -0.9 pp both before and after 2008. Neertheless, our results suggest that, when significant, the effect of UR_t before 2008 becomes smaller in magnitude and at times even loses significance post 2008.

From Table A7, we note that, for morbidity indicators, mainly, the significant coefficients are those associated to the 2008 indicator variable and are larger for females than those for males. The only exception is mental health: an increase in UR_t of one pp is associated with a decrease in its likelihood in 0.6 pp for men compared to a reduction of 0.4 for women. After 2008, the AME of UR_t on mental health is only significant for men (0.5 pp).

5.2.3. Estimates by Education Level

Columns (3) and (4) in Tables A5 to A7 in the Appendix show the AMEs by education level. We distinguish individuals with a degree or above from those with educational attainment below Degree. Table A5 reinforces the conclusion that the recession affected health behaviours and BMI through changes that went beyond worsened UR_t and it did so with different intensities by educational level: the recession indicator is associated to an increase in 0.17 units in vegetable consumption for the more educated but a decrease in fruit intake in 0.37 units for the less educated. The increase in BMI is larger in magnitude for the lesser educated (1.26 units) than for those with at least a Degree (0.63 units). This translates in a shift in the overweight prevalence that is experienced more acutely by the less educated also as they are 6.8 and 3.8 pp more likely of being obese or severely obese after 2008, respectively. The estimate of UR_t is only significant for overweight and associated to an increase in 1.28 pp both before and after the recession, which compensates the negative estimate associated to *d08* of 6.9 pp.

In Table A6, we observe that changes in UR_t are more relevant for cigarette consumption and smoking than for diet and BMI. Before 2008, the less educated experienced a reduction in 0.34 cigarettes when UR_t increased in one pp, compared to a reduction of 0.23 after 2008. The effect for the more educated is significant only after 2008 and of smaller magnitude. UR_t also changes smoking

intensity for the less educated more acutely. For this group, a one pp increase in UR_t is associated to 2.3 (2.1) pp higher likoelihood of moderate smo*king* prior to (after) 2008. The same change in UR_t is associated to a decrease in the likelihood of smoking heavily by 3.3 (2.6) pp before (after) 2008. The only statistically significant effect of UR_t on drinking is on the probability of moderate drinking, with those less educated being 1 (0.87) pp less likely to exhibit moderate drinking before (after) 2008 with each percentage increase in UR_t.

For those with higher education not only the UR_t but also the recession indicator have a significant AME on smoking. The onset of the recession is associated to a reduction in the likelihood of smoking heavily of 17 pp after 2008. For the more educated, drinking behaviour is also significant associated to the onset of the recession itself and not so much changes in UR_t. The probability of not drinking of this group increases in 11.2 pp since 2008 and that of being a moderate drinkers decreases by 5.2 pp.

By looking at Table A7, we note that the effect on morbidity is mostly through *d08* and marginally through UR_t. In general, the panel for the less educated have more significant and larger in absolute value AMEs than the panel for those with more education, and thus, the recession may have hit more heavily the less educated. For instance, medications' intake increases in 0.64 units since 2008 for those less educated as opposed to 0.26 for the more educated. Those with education below degree show an increase in the probabilities of having diabetes, heart and mental problems by 2.7, 3 and 6.4 pp after 2008, respectively. The AME associated to UR_t on having high blood pressure is negative but positive on the likelihood of having diabetes, heart and mental problems.

6 Discussion and concluding remarks

The paper studies the changes in individual health experienced in England with the onset of the Great Recession of 2008. One contribution of this study to the extant literature is that we focus on individual health risks, behaviours and also morbidity as opposed to mortality. As health effects often take a length of time to materialise, by including behavioural risk factors in the analysis we are able to pin point short and potential long term effects of the economic downturn on health. We capture macroeconomic conditions using regional UR, as well as an indicator variable for the recession and an interaction term of both. This allows us to explore if the effects of the economic downturn transcend those associated with changes arising purely from worsened regional URs and if the recession altered the relationship between health risks, intermediate health outcomes and regional URs.

Our results suggest that changes in regional *UR* mainly affect smoking and alcohol intake. An increase in *UR* is associated with a decrease in daily cigarette consumption, which translates in a shift from heavy to moderate smoking. The evidence of the effect of regional *UR* on drinking behaviour is mainly to decrease in the likelihood of moderate drinking. The only morbidity indicator significantly associated with a change in regional *UR* is the likelihood of having mental health problems which decreases with regional *UR* but this negative effect, which is in line with some of the previous literature (Charles and DeCicca, 2008), is more than compensated by the positive effect associated with the onset of the recession, being the net effect an increase of mental health problems since 2008. Thus, our findings reveal that mental health problems are indeed positively asssociated with economic recessions but that the mechanisms transcend worsened regional URs.

The results of the effect of lagged regional *UR* on smoking and drinking behaviours maintain those obtained with the contemporaneous *UR*. However they also suggest that there was some delay in the impact of the 2008 economic contraction on morbidity. In terms of specific effects, both current and lagged *UR* effects indicate that its association with mental health is pro-cyclical whereas its relationship with cancer, digestive problems and diabetes is counter-cyclical. Throughout all our specifications we find consistent evidence that the impact of *UR* is slightly larger before the Great Recession than after. This suggests that the direct influence of regional *UR* on health risks, behaviours and morbidity are subdued during severe economic shocks. We also find that the direct regional *UR* effects are generally larger for women and the less educated.

Turning to the direct impact of the recession no captured by worsened *UR*, we observe that the onset of the recession per se is associated with worse dietary habits and increased BMI and obesity. The onset of the recession is also associated with a shift away from heavy risky behaviours while supporting moderate smoking and alcohol consumption. The relevance of this is emphasised in the light of lifestyle-related health problems costing the NHS £11 billion a year (Public Health England, 2016). The onset of recession is also associated with an increase in the use of medicines and a higher likelihood of suffering diabetes, heart and mental health problems, all of which are in general experienced more acutely by those with less education and by women.

Finally, most interestingly, the inclusion of the interaction of the recession indicator and regional *UR* in our benchmark specifications allows us to identify a moderation in the impact of changes in regional *UR* on the health behaviours and risks after the recesssion of 2008. This corroborates the evidence on smoking and drinking using US data (Ruhm and Black, 2002; Ruhm, 2005) on health behaviours improving (or risky health behaviours softening) during economic adversity. Thus, the uptake of healthy risk behaviours appear to be somewhat counter-cyclical.

The nature of some of the variables may be considered a limitation of the study. Our morbidity measures are very aggregate: mental disorders include depression as well as other disorders (such as schizophrenia), which are less likely to be triggered by an economic downturn. Similarly, heart problems include a variety of conditions, apart from heart attacks and strokes. Finally, some of the effects of the recession may take time to materialise, hence checking the robustness of our results using a lag of the *UR* in our estimates, and the behavioural aspects may be seen to be more heavily associated with the impact of the economic climate at a later period.

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Appendix

Table A1: Descriptive Statistics: health risks, behaviours and morbidity indicators

	pre-2008			*post-2008*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Mean	**SDev**	**N**	**Mean**	**SDev**	**N**	**Difference in means**
Health Risks and Behaviours							
Vegetables	1.45	1.26	61868	1.53	1.31	29176	***
Fruit	2.14	2.01	61869	2.11	1.92	29176	**
BMI	27	5.08	56275	27.45	5.31	36809	***
Overweight	38.2%	49%	56275	38.1%	49%	36809	
Obese	21.7%	41%	56275	23.5%	42%	36809	***
Severely Obese	1.9%	14%	56275	2.6%	16%	36809	***
Cigdaily	3.31	7.25	63549	2.541	6.31	42446	***
Light Smoker	30.3%	46%	15411	34%	48%	8582	***
Moderate Smoker	40.6%	49%	15411	42%	49%	8582	**
Heavy Smoker	29%	45%	15411	23.5%	42%	8582	***
Not drinking	32.2%	47%	63008	36%	48%	42359	***
Light drinking	31.8%	47%	63008	28.8%	45%	42359	***
Moderate drinking	19.2%	39%	63008	17.2%	38%	42359	***
Heavy drinking	16.7%	37%	63008	18%	38%	42359	***
Health Outcomes							
Medicines	1.49	2.34	46478	1.9	2.81	30809	***
Cancer	4.3%	20.2%	29622	5.0%	21.7%	18592	***
Digestive	11.1%	31.4%	29622	11.2%	31.5%	18592	
Diabetes	8.4%	27.8%	29604	7.8%	26.9%	18591	**
High BP	15.1%	35.8%	29604	11.6%	32.0%	18591	***
Heart	12.8%	33.4%	29604	9.6%	29.5%	18591	***
Mental	7.4%	26.1%	29604	7.0%	25.6%	18591	

Notes: Descriptive statistics are presented for the pooled sample. Sample includes individuals aged 16 and above. Time period 2001-2013, except for vegetables and fruit consumption for which data covers 2001-2011. Column (7) shows the test for the difference in sample means. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Table A2. AMEs ofr the economic cycle indicators on Diet and BMI

	(N)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Vegetables	91,044					
UR (t/t-1)		-0.0039			0.0039	
d08			-0.0117	0.0548		0.0636
UR at d08=0				0.0043		0.0074
UR at d08=1				-0.0056		-0.0046
Fruit	91,045					
UR (t/t-1)		0.0121			-0.0061	
d08			-0.1876***	-0.2641***		-0.2256***
UR at d08=0				0.0063		-0.0082
UR at d08=1				0.0135		-0.0007
BMI	93,084					
UR (t/t-1)		-0.059			-0.0323	
d08			0.754***	0.940***		0.882***
UR at d08=0				-0.0551		-0.0288
UR at d08=1				-0.0594		-0.0352
Overweight	93,084					
UR		0.0041			0.002	
d08			-0.0365***	-0.0593***		-0.0650***
UR at d08=0				0.0021		0.00003
UR at d08=1				0.0043		0.0036
Obese	93,084					
UR (t/t-1)		-0.0044			-0.0016	
d08			0.0443***	0.0528***		0.0475**
UR at d08=0				-0.005		-0.0017
UR at d08=1				-0.0043		-0.0015
Severely Obese	93,084					
UR (t/t-1)		-0.0019			-0.0014	
d08			0.0204***	0.0318***		0.0337***
UR at d08=0				-0.0007		-0.0004
UR at d08=1				-0.0017		-0.0016

Note: Models for vegetables, fruit are estimated using IV Tobit, the rest with IV Probit. The estimates for BMI are estimated using 2SLS methods. Estimation includes socio-economic controls, time and regional dummies included but only AMEs for the economic indicators shown. Each column includes either one or both economic variables with their interaction. The AME is computed as the partial effect of the relevant economic variable on the corresponding health measure. In columns (3) and (5) where the interaction is included, the partial effect is for the UR is evaluated first when d08 equals 0 and then when d08 is equal to 1. This is to reflect on potential differences of the UR before and after the Great Recession. N indicates number of observations. *** p<0.01, ** p<0.05, * p<0.1.

Table A3. AMEs of economic cycle indicators on Smoking and Alcohol

	(N)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Cigadaily	105,995					
UR (t/t-1)		-0.2110***			-0.2088***	
d08			0.3836***	0.4315		0.5229
UR_t at d08=0				-0.2937***		-0.2368***
UR_t at d08=1				-0.2065***		-0.1813***
Light Smoker	23,993					
UR (t/t-1)		0.0089			0.0154**	
d08			0.0326**	0.029		0.0171
UR at d08=0				0.0124		0.0174**
UR at d08=1				0.0082		0.0131*
Moderate Smoker	23,993					
UR (t/t-1)		0.0167*			0.0083	
d08			0.0553***	0.0236		0.0291
UR at d08=0				0.0192*		0.008
UR at d08=1				0.0162*		0.0086
Heavy Smoker	23,993					
UR (t/t-1)		-0.0212***			-0.0223***	
d08			-0.0939***	-0.0737*		-0.0647
UR at d08=0				-0.0263***		-0.0237***
UR at d08=1				-0.0208**		-0.0202**
No drinking	105,367					
UR (t/t-1)		0.0055			0.0064*	
d08			0.1247***	0.1363***		0.1300***
UR at d08=0				0.0105**		0.0085**
UR at d08=1				0.005		0.0049
Light Drinking	105,367					
UR (t/t-1)		-0.0003			0.0012	
d08			-0.0578***	-0.0766***		-0.0889***
UR at d08=0				-0.0038		-0.0012
UR at d08=1				-0.00002		0.0031
Moderate Drinking	105,367					
UR (t/t-1)		-0.0066*			-0.0087***	
d08			-0.0512***	-0.0365**		-0.0282
UR at d08=0				-0.0072*		-0.0088***
UR at d08=1				-0.0066*		-0.0087***
Heavy Drinking	105,367					
UR (t/t-1)		-0.0046			-0.004	
d08			-0.0203***	-0.0093		0.0031
UR at d08=0				-0.005		-0.0031
UR at d08=1				-0.0046		-0.0048

Note: Model for cigarette consumption (Cigdaily) is estimated using IV Tobit and for the other health dependent variables we use IV Probit. See notes in Table A2. N indicates number of observations. *** p<0.01, ** p<0.05, * p<0.1.

Table A4. AMEs of the economic cycle indicators on Morbidity

	(N)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Medicines	77,287					
UR (t/t-1)		-0.0036			0.0078	
d08			0.4910***	0.4453***		0.4058***
UR at d08=0				-0.0141		0.0023
UR at d08=1				-0.0032		0.0123
Cancer	106,550					
UR (t/t-1)		0.0001			-0.0019*	
d08			0.0008	0.0009		0.0032
UR at d08=0				0.0001		-0.0020*
UR at d08=1				0.0001		-0.0018
Digestive	106,550					
UR (t/t-1)		-0.0016			-0.0033*	
d08			0.0024	0.0031		0.0061
UR at d08=0				-0.0022		-0.0036**
UR at d08=1				-0.0016		-0.003
Diabetes	106,550					
UR (t/t-1)		-0.0013			-0.0032**	
d08			0.0235** *	0.0215***		0.0248***
UR at d08=0				-0.0024		-0.0038**
UR at d08=1				-0.0013		-0.0028
High BP	106,550					
UR (t/t-1)		0.0016			0.0013	
d08			-0.0066	-0.0243**		-0.0319***
UR at d08=0				0.0002		-0.0009
UR at d08=1				0.0043		0.0043
Heart	106,550					
UR (t/t-1)		-0.0011			0.0011	
d08			0.0116** *	0.0237**		0.0219**
UR at d08=0				-0.0012		0.0023
UR at d08=1				-0.0021		0.001
Mental	106,550					
UR (t/t-1)		-0.0054***			-0.0030*	
d08			0.0420***	0.0537***		0.0509***
UR at d08=0				-0.0055***		-0.0031*
UR at d08=1				-0.0046**		-0.0021

Note: Model for *Medicines* is estimated using IV Tobit. The rest are obtained using IV Probit. See notes in Table A2. N indicates number of observations. *** p<0.01, ** p<0.05, * p<0.1.

Table A5. AMEs of the economic cycle indicators on Diet and BMI by Gender and Education

		Gender		Education	
		(1)	(2)	(3)	(4)
		Men	*Women*	*Degree or higher*	*Below degree*
Vegetables	N	40,757	50,287	26,390	55,759
d08		0.1125*	0.0074	0.1769*	-0.0284
UR at d08=0		0.0088	0.0016	0.0014	0.011
UR at d08=1		-0.0119	0.0003	-0.0168	0.0052
Fruit	N	40,756	50,289	26,390	55,760
d08		-0.2242**	-0.3013***	-0.0467	-0.3770***
UR at d08=0		-0.0209	0.0317	0.0298	-0.0037
UR at d08=1		-0.003	0.0284	0.005	0.0202
BMI	N	42,540	50,544	28,191	56,102
d08		0.675**	1.137***	0.633*	1.261***
UR at d08=0		0.0336	-0.129	-0.0661	-0.0599
UR at d08=1		0.00458	-0.113	-0.0494	-0.0723
Overweight	N	42,540	50,544	28,191	56,102
d08		-0.1054***	-0.0204	-0.0372	-0.0695***
UR at d08=0		0.0045	0.0003	-0.0128	0.0128*
UR at d08=1		0.0056	0.0033	-0.0089	0.0128**
Obese	N	42,540	50,544	28,191	56,102
d08		0.0819***	0.0243	0.0408	0.0685***
UR at d08=0		-0.0037	-0.0058	-0.0042	-0.0076
UR at d08=1		-0.0052	-0.0033	-0.0009	-0.0074
Severely Obese	N	42,540	50,544	28,191	56,102
d08		0.0182**	0.0423***	0.0209*	0.0383***
UR at d08=0		0.0016	-0.0027	0.0034	-0.0025
UR at d08=1		0.0002	-0.0035	0.0002	-0.003

Note: Figures in this table show the AMEs for the full specification using the contemporaneous UR as in Column (3) Table 5. See notes in Table A4. N indicates number of observations. *** p<0.01, ** p<0.05, * p<0.1.

Table A6. AMEs of the economic cycle indicators on Smoking and Alcohol by Gender and Education

		Gender		Education	
		(1)	(2)	(3)	(4)
		Men	*Women*	*Degree or higher*	*Below degree*
Cigdaily	N	47,443	58,552	31,710	64,707
d08		0.6085	0.2654	0.7245	0.6686
UR at d08=0		-0.2684**	-0.3114***	-0.1707	-0.3393***
UR at d08=1		-0.1555	-0.2407***	-0.1996*	-0.2314**
Light Smoker	N	11,088	12,905	4,655	17,452
d08		0.002	0.0448	0.0254	0.0183
UR at d08=0		0.0109	0.016	0.0232	0.0142
UR at d08=1		0.0094	0.0088	0.0228	0.0076
Moderate Smoker	N	11,088	12,905	4,655	17,452
d08		0.037	0.0173	0.1136	0.021
UR at d08=0		0.017	0.0195	-0.0061	0.0231*
UR_t at d08=1		0.0129	0.0174	-0.0123	0.0208*
Heavy Smoker	N	11,088	12,905	4,655	17,452
d08		-0.0561	-0.0859*	-0.1742**	-0.0535
UR at d08=0		-0.0211*	-0.0315***	-0.0102	-0.0326***
UR at d08=1		-0.0171	-0.0250**	-0.0044	-0.0260***
No drinking	N	47,204	58,163	31,651	64,347
d08		0.1161***	0.1522***	0.1119***	0.1476***
UR at d08=0		0.0118*	0.0088	0.0088	0.0100*
UR at d08=1		0.0086*	0.0016	0.005	0.0047
Light Drinking	N	47,204	58,163	31,651	64,347
d08		-0.0368	-0.1084***	-0.0427	-0.1000***
UR at d08=0		-0.0061	-0.0013	-0.0071	-0.0033
UR at d08=1		-0.0037	0.0035	-0.0049	0.0016
Moderate Drinking	N	47,204	58,163	31,651	64,347
d08		-0.0488**	-0.0269	-0.0519*	-0.0264
UR at d08=0		-0.0055	-0.0090*	-0.0054	-0.0096**
UR at d08=1		-0.0044	-0.0086**	-0.0054	-0.0087**
Heavy Drinking	N	42,154	58,163	31,651	64,347
d08		-0.0013	-0.007	0.0046	-0.0122
UR at d08=0		-0.0113*	-0.002	0.0006	-0.0042
UR at d08=1		-0.0125**	-0.0009	-0.001	-0.0043

Note: Figures in this table show the AMEs for the full specification using the contemporaneous UR as in Column (3) Table 2. See notes in Table A4. *** p<0.01, ** p<0.05, * p<0.1.

Table A7. AMEs of the economic cycle indicators on Morbidity

		Gender		Education	
		(1)	(2)	(3)	(4)
		Men	*Women*	*Degree or higher*	*Below degree*
Medicines	N	34,521	42,775	23,486	46,781
d08		0.4017***	0.4534***	0.2595**	0.6468***
UR at d08=0		-0.0004	-0.0449*	0.0195	-0.0670***
UR at d08=1		0.0079	-0.0314	0.0085	-0.0439*
Cancer	N	47,713	58,837	31,270	64,914
d08		0.0016	-0.0009	0.0112	-0.0036
UR at d08=0		-0.0021	0.0024	-0.0036*	0.0011
UR at d08=1		-0.0013	0.0009	-0.0036*	0.0014
Digestive	N	47,713	58,837	31,740	64,914
d08		0.0037	0.0017	0.0089	0.0031
UR at d08=0		0.0003	-0.0039	-0.0055	-0.0005
UR at d08=1		-0.0007	-0.0023	-0.0056*	0.0004
Diabetes	N	47,716	58,834	31,737	64,918
d08		0.0376***	0.0087	0.0165	0.0269**
UR at d08=0		-0.0009	-0.0035	-0.0009	-0.0043
UR at d08=1		-0.0004	-0.0021	0.0001	-0.0029
High BP	N	47,716	58,834	31,737	64,918
d08		-0.0197	-0.0323**	-0.0135	-0.0262*
UR at d08=0		0.0031	-0.0017	0.0002	-0.0004
UR at d08=1		0.0048	0.0046	0.0016	0.0048
Heart	N	47,716	58,834	31,737	64,918
d08		0.0211	0.0231*	0.0206	0.0298**
UR at d08=0		-0.0017	-0.0002	0.002	-0.0009
UR at d08=1		-0.0026	-0.0011	0.0002	-0.0023
Mental	N	47,716	58,834	31,737	64,918
d08		0.0484***	0.0557***	0.0484***	0.0638***
UR at d08=0		-0.0062**	-0.0044*	-0.0053*	-0.0043
UR at d08=1		-0.0058**	-0.0026	-0.0049	-0.0033

Note: Figures in this table show the AMEs for the full specification using the contemporaneous UR as in Column (3) Table 3. See notes in Table A4. *** p<0.01, ** p<0.05, * p<0.1.